NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

DETERMINING HOW TO BEST PREDICT NAVY RECRUITING USING VARIOUS ECONOMIC VARIABLES

by

Timothy L. Henderson

March 2015

Thesis Advisor: Jeremy Arkes
Co-Advisor: Dina Shatnawi

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704–0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 2015	Master's Thesis

4. TITLE AND SUBTITLE
DETERMINING HOW TO BEST PREDICT NAVY RECRUITING USING VARIOUS ECONOMIC VARIABLES

5. FUNDING NUMBERS

6. AUTHOR(S) Timothy L. Henderson

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Naval Postgraduate School
Monterey, CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)
N/A

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____NPS.2015.0006-IR-EP5-A____.

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited

12b. DISTRIBUTION CODE
A

13. ABSTRACT (maximum 200 words)

The objective of this study is to examine the effect that state-level and county-level economic variables have on U.S. Navy recruiting. To achieve this goal, I conducted state-level and county-level fixed effects models that examined the effects of state and county unemployment rates, as well as state employment-to-population ratios on Navy recruiting applicant rates, accession rates, high-quality applicant rates, and high-quality accession rates over the years from 1991 to 2013. Through the state-level and county-level fixed effects model estimation, it is determined that state unemployment rates, state employment-to-population ratios, and county unemployment rates all have a statistically significant effect on Navy recruiting, and that they all predict Navy recruiting equally well.

14. SUBJECT TERMS
Manpower/supply, personnel, requirements/determination, economy

15. NUMBER OF PAGES
69

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UU

NSN 7540–01-280-5500

Standard Form 298 (Rev. 2–89)
Prescribed by ANSI Std. 239–18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

DETERMINING HOW TO BEST PREDICT NAVY RECRUITING USING VARIOUS ECONOMIC VARIABLES

Timothy L. Henderson
Lieutenant, United States Navy
B.S., United States Naval Academy, 2007

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 2015

Author: Timothy L. Henderson

Approved by: Jeremy Arkes
Thesis Advisor

Dina Shatnawi
Co-Advisor

William Gates
Dean, Graduate School of Business and Public Policy

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

The objective of this study is to examine the effect that state-level and county-level economic variables have on U.S. Navy recruiting. To achieve this goal, I conducted state-level and county-level fixed effects models that examined the effects of state and county unemployment rates, as well as state employment-to-population ratios on Navy recruiting applicant rates, accession rates, high-quality applicant rates, and high-quality accession rates over the years from 1991 to 2013. Through the state-level and county-level fixed effects model estimation, it is determined that state unemployment rates, state employment-to-population ratios, and county unemployment rates all have a statistically significant effect on Navy recruiting, and that they all predict Navy recruiting equally well.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

AFQT	armed forces qualification test
BLS	Bureau of Labor Statistics
CNRC	Commander, Navy Recruiting Command
CPS	current population survey
DMDC	Defense Manpower Data Center
FIPS	federal information processing code
IPUMS-CPS	integrated public use market data series current population survey
JAMRS	joint advertising market research and studies
NBER	National Bureau of Economic Research
NRC	Navy Recruiting Command
NRD	Navy Recruiting District
NRS	Navy recruiting station

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

First and foremost, I would like to thank God for giving me the strength, energy, and perseverance to complete this thesis.

I would also like to express my gratitude to my thesis advisors, Professors Dina Shatnawi and Jeremy Arkes. The knowledge and expertise they shared with me helped carry me through this entire research process.

Additionally, I would like to thank the many other professors who directly and indirectly offered guidance and support during this process.

Finally, I have to thank my supportive wife and our children. The past 21 months have been challenging, but experiencing their love and support each day, no matter how difficult things got, truly helped me to push forward. Again, I thank you and I love you.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

Recruiting in the military has been quite cyclical over the past 25 years. While recruiting was relatively easy in the early 1990s, the Army, Navy, and Air Force all missed recruiting targets in 1998 and 1999 (Warner, Simon, & Payne, 2003). According to Warner et al. (2003), during this period, these services also witnessed a decline in quality recruits, those recruits with a high school diploma and that have a scored a 50 or greater on the Armed Forces Qualification Test from the early 1990s. To address the recruiting shortages of the late 1990s, services implemented various enlistment bonuses and bolstered the recruiting force (Warner et al., 2003). However, in an October 2014 birthday message to the Navy's Human Resources Community from the Navy's Human Resources flag officers, HR leaders boasted of how Navy recruiting ended FY 2014 having achieved 100% of its Enlisted Active component mission for the 89th month in a row (A. Andrews, personal communication, October 21, 2014).

The roughly seven and a half consecutive years of the Navy meeting recruiting targets dates back to about the time that the Great Recession began in December 2007, according to the National Bureau of Economic Research. The common thread linking these two periods of recruiting together is that of the health of the U.S. economy—consistently a factor in recruiting success. During periods where the economy is doing well, military recruiting in general tends to struggle. Conversely, when the economy is down, recruiting targets seem to be met more easily.

One explanation offered for this trend is that some view the military as a means of professional stability that is unaffected by the state of the economy (Murphy, 1999). According to Murphy, when the economy is performing poorly, potential recruits may view the opportunity cost of joining the military as low. However, when the economy is doing well, there are outside options that may be perceived as more alluring in the civilian sector. There are other explanations for why people join the military that may or may not be related to the economy. People also join because of the educational benefits the military offers its members and for patriotic reasons such as during the period following the tragic events of 9/11 (Spring 2014 Youth Poll Propensity, 2014).

While the economy, educational benefits, and patriotism are all reasons individuals may decide on joining the military, these very reasons also offer rationale on why individuals seek employment outside the military. Some view the civilian sector as providing higher wages and a more stable home life than the military can offer, and therefore are not willing to join the military. Others seek higher education on their own, rather than joining the military, as it offers the opportunity for higher wages than the military can offer. There are also those individuals who will not join the military due to events such as 9/11 because they reject the prospects of participating in war.

Studies being conducted by Joint Advertising, Market Research & Studies (JAMRS) are already beginning to show a decline in the propensity of youth to enlist (Spring 2014 Youth Poll Propensity, 2014). With the economy in the midst of recovery, and events such as 9/11 becoming more of a distant memory, recruiting could become as difficult as it was in the late 1990s and mid-2000s, leading to recruiting targets being missed once more.

This thesis examines the impact that state and county economic variable rates have on Navy recruiting, while also examining whether there are economic variables other than the unemployment rate that can better predict recruiting. In particular, this study will answer the following research questions: Does the county or state economic variable rate offer a better predictor for Navy recruiting? Is there an economic variable other than unemployment rate that offers a better predictor for Navy recruiting? Through an understanding of these effects, the Navy will be able to better identify means of coping with the constant change that occurs in the economy every few years in order to continue to meet recruiting requirements. This study will also provide a framework for analysis in other services, leading to a more resilient and diverse U.S. Military that is able to sustain higher overall levels of readiness.

The remainder of this thesis is organized as follows: Chapter II presents background and literature review. Chapter III describes the data and methodology used in the study, and Chapter IV provides the regression results and discussion. Finally, Chapter V presents conclusions and recommendations drawn from the study.

II. LITERATURE REVIEW

A. OVERVIEW

This chapter provides a background on Navy Recruiting. It includes a brief overview of economic conditions and the history of the propensity to enlist in the military in the United States from 1991 to 2014. From there, the chapter offers other factors that also affect military recruiting, and then ends with a review of previous research related to this study.

B. BACKGROUND INFORMATION ON NAVY RECRUITING

1. History of Navy Recruiting Command

Navy recruiters have been a part of U.S. history since the time of Revolutionary War when the nation's first Navy recruiters were assigned to the Marine Committee. With the importance of the naval force growing, the Secretary of the Navy assumed direct responsibility for recruiting. After shuffling from the Bureau of Construction and Repair, and then to the Bureau of Navigation, the mission of naval recruiting was assigned to the Bureau of Naval Personnel in 1942.

On April 6, 1971, the Secretary of the Navy established the Navy Recruiting Command to serve as a field activity of the Chief of Naval Personnel. This change came in response to the end of the military draft, causing an increased emphasis on Navy recruiting, with the last draft call being made the following year (CNRC, n.d.). Navy Recruiting Command remained in Washington, DC, until July 1999, when the headquarters relocated to its current facilities at Naval Support Activity Mid-South, Millington, TN.

With the constant evolution and technological advances that continue to take place in the Navy, successful recruiting remains paramount. As the equipment on the Navy's ships, submarines, and aircraft continues to become more sophisticated, the duty lies upon Navy recruiters to find, inspire, and recruit the best and brightest young men and women to field the diverse and high-tech Navy of the 21st century.

2. Mission

According to Commander, Navy Recruiting Command (CNRC):

> Navy Recruiting Command is charged to seek out, source and recruit the best and brightest young men and women to sustain and maintain a cadre of ready personnel. This state of readiness is achieved through: strong integrity-based leadership, spirited teamwork, and a commitment to excellence. Navy Recruiting Command is ready to responsibly employ its assets to provide its recruiting field all the necessary resources to deliver the highest quality Sailors to the fleet, and it has a professional and moral obligation to uphold our covenant with our recruiting force – military and civilian – and our Future Sailors (n.d.).

3. Command Structure

The structure of the Navy Recruiting Command consists of the following five components:

a. Navy Recruiting Command

As the headquarters, Navy Recruiting Command (NRC) provides strategic oversight for Navy recruiting. Working hand-in-hand with the Chief of Naval Personnel (CNP), NRC receives future personnel requirements. In doing so, NRC then establishes policy guidelines and incentive programs that encourage efficient and ethical recruiting practices to achieve requirements.

b. Navy Recruiting Region

Located within NRC headquarters in Millington, TN, region commanders divide the nation into two regions, Region East and Region West. Figure 1 depicts Region East, which is located to the right of the red line and Region West is all located to left. Each region is composed of 13 districts, which includes the following overseas locations: Europe, Guam, Japan, Puerto Rico, and the Virgin Islands.

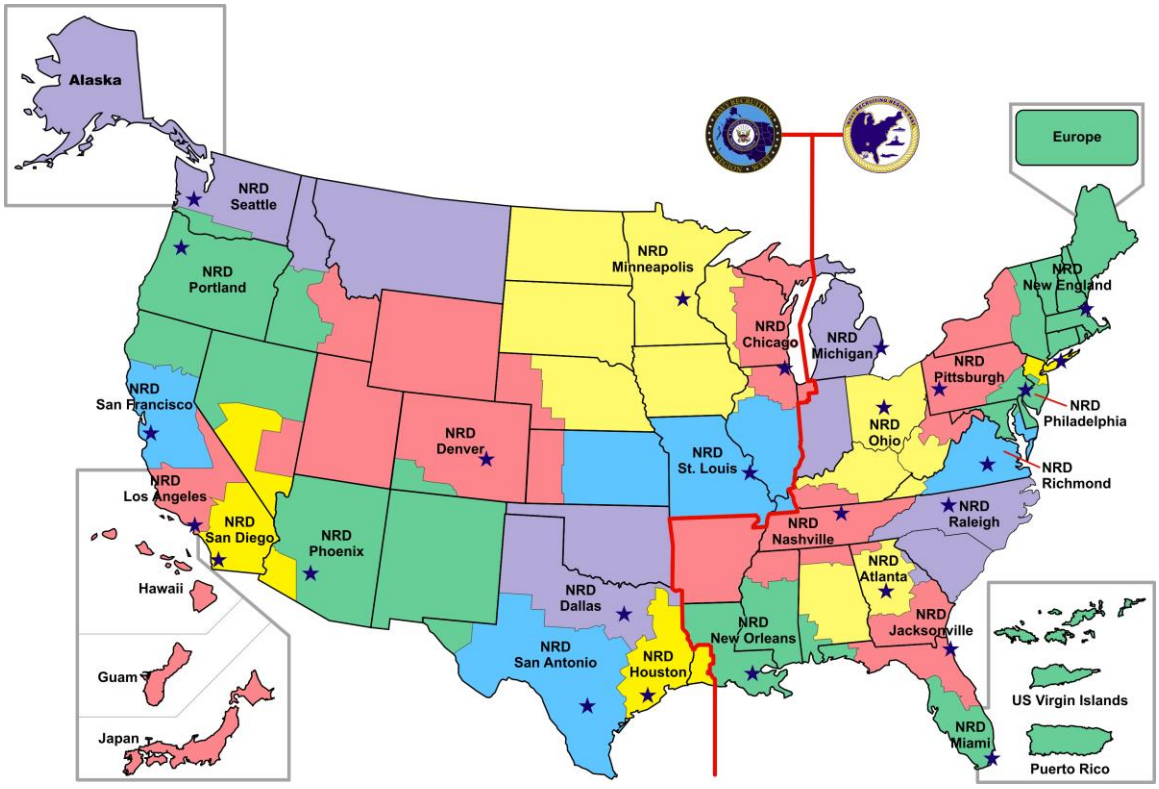

Figure 1. Regions and District Map (from CNRC, n.d.)

c. Navy Recruiting District

There are 26 Navy recruiting districts (NRDs) divided between the two Navy recruiting regions, each strategically placed throughout the nation (see Figure 1) to ensure national recruiting coverage.

d. Navy Recruiting District Division

Each NRD geographic AOR is further subdivided into divisions. Depending on the geographic area of an NRD, an NRD may consist of 6 to 10 divisions.

e. Navy Recruiting Station

The Navy recruiting stations (NRS) are spread out among the 26 NRDs and are ideally placed in a geographic location with a high propensity for enlistment. NRS locations are identified and organized by ZIP code through demographic and past

production data, and all ZIP codes with the NRD must be assigned to a NRS regardless of population density.

C. ECONOMIC CONDITIONS FROM 1991–2014

Understanding the economic climate over the last 15 years is important to identify the relationship between unemployment rates and recruitment rates. The U.S. economy has experienced numerous ups and downs since 1990. Figure 2 illustrates the changes that have taken place in the unemployment rate since 1990.

1. Early 1990s Recession

According to the National Bureau of Economic Research, the recession of the early 1990s lasted from July 1990 to March 1991. This recession was mainly attributed to the workings of the business cycle, as well as events such as the S&L Crisis in 1989, and a spike in gas prices as the result of the Gulf War. During this period, the National Bureau of Economic Research (NBER) reported that unemployment rose from 5.4% in January 1990 to 6.8% in March 1991, and continued to rise to a peak of 7.8% in June 1992.

2. 1990s United States Boom

The 1990s United States boom officially began with the end of the early 1990s recession in March 1991, according to the National Bureau of Economic Research. During this extended period of economic prosperity, the GDP increased continuously for almost ten years, which is the longest recorded expansion in the history of the United States. This period experienced strong economic growth, steady job creation, low inflation, and rising productivity. Events such as the dot.com bubble jumpstarted the economy in the mid-1990s, and in May 1997, unemployment fell below 5% for the first time since December 1973. In April 2000, unemployment dropped to 3.8%, and was below 4% September-December 2000. For the whole 1990–2000 period, roughly 23,672,000 jobs were created and hourly wages had increased by a solid 10.1% since 1996.

3. Early 2000s Recession

The early 2000s recession has been determined by NBER as the period from March 2001 to November 2001. In 2001, the Labor Department estimated that a net 1.735 million jobs were shed. Unemployment rose from 4.2% in February 2001 to 5.5% in November 2001 (Martel & Langdon, 2001).

4. Great Recession

The Great Recession lasted from December 2007 through June 2009, making it the longest of any recession since World War II, according to NBER (n.d.). During this period, unemployment rose from 5% in 2008 to 10% by late 2009, with the number of unemployed increasing from 7 million to 15 million. Housing prices also fell during this period by an average of 30%.

5. 2009 to Present

The economy has yet to fully recover from the Great Recession, but the unemployment rates have steadily declined since its peak in 2009. Also, housing prices reached a trough in 2012 similar to that of 2008, but has continued to rise since. These variables, along with various others, indicate that the economy is in an upward turn with the peak currently unforeseen, according to NBER.

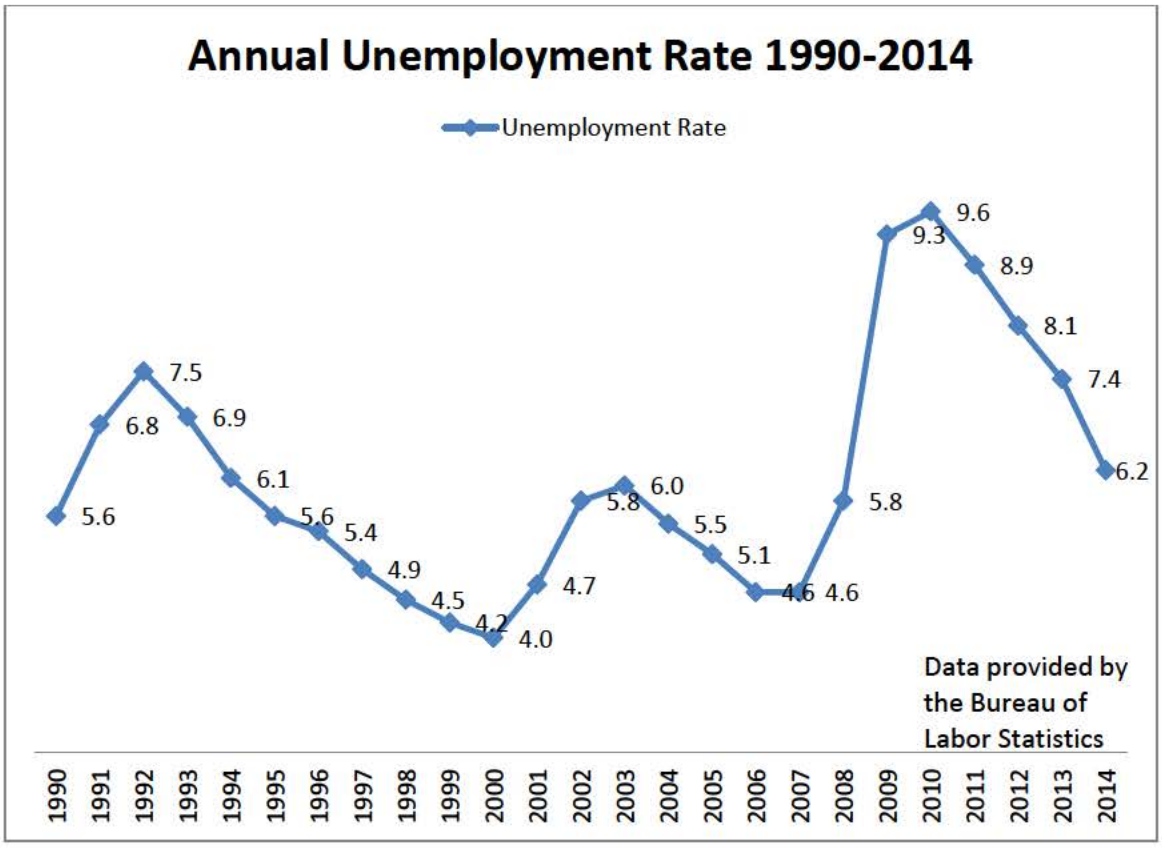

Figure 2. U.S. Unemployment Rate since 1990

D. JOINT ADVERTISING, MARKET RESEARCH & STUDIES NEW RECRUIT SURVEYS

As stated by the Joint Advertising, Market Research & Studies (JAMRS) program, the objective of the organization is to preserve and enhance the All-Volunteer Force. JAMRS independently monitors markets essential to recruiting and is responsible for maintaining a comprehensive prospect database and executing an integrated outreach campaign.

JAMRS performs three main functions with the first being conducting research and analysis within the DOD that monitors the youth market and provides information regarding youths' interest in joining, reasons for and against joining, barriers to joining, and awareness of and reactions to DOD advertising recruiting efforts. The second main function is that of maintaining a comprehensive prospect database that represents one of the primary tools that recruiters use to locate, identify, and contact prospects. The third

main function is reaching out to influencers, such as parents, grandparents, educators, and coaches – another integral aid to recruiting. Through these functions, the efforts of JAMRS aid in providing key insight into the effect the economy has had on the military in general, along with the Navy specifically.

1. General Military Propensity versus U.S. Economy

The propensity to enlist is a factor used to determine potential recruiting success as the propensity to join the military is a representation of one's behavioral intentions regarding enlistment. According to the Theory of Reasoned Action (Fishbein & Ajzen, 1975), behavioral intentions are strong predictors of actual behavior. The higher propensity rates are at a given time inherently results in a less difficult time recruiting. The chart in Figure 3 displays historical general military propensity by gender over the last 30 years. When analyzing the chart, as would be expected, the propensity to enlist appears to be strongly correlated with the economy. The major peaks and troughs occur mainly around the times of significant change in the economy.

The first significant drop that is noted that falls into the period of this study, 1991–2014, occurs in 1991 where the propensity to enlist dropped from 17% in 1991 to 12% in 1992. This drop coincides with the 1990s U.S. boom, beginning in March 1991 (NBER, n.d.). For the rest of the 1990s, small changes in the propensity rate occurred, but the rates remained fairly stable until 1999 where the rate dropped from 16% back to the rate of 12%, the lowest since 1991. The propensity rate then remained at 12% through August 2001. The period where this significant drop occurred took place during a time of historic lows in unemployment, therefore, again coming as no surprise.

From August 2001 to November 2001, the propensity rate jumped from 12% back up to 16%. This spike was to be expected because of the patriotic factor in play with the tragic events of 9/11 taking place during this time. However, it remains to be seen how much the events of 9/11 factored into the propensity rates because the U.S. also suffered another recession from March to November 2001 (NBER, n.d.). It should be noted that the propensity rates dropped from 16% down to 13% from November 2001 to the following November 2002.

From November 2001 through the mid-2000s, the propensity rates fluctuated with a low of 13% in November 2001 and a high of 18% in November 2003. The next significant drop to occur took place between June 2005 and June 2007 when the propensity rate decreased 16% to 8%, with 8% being the lowest propensity rate recorded throughout the course of tracking this rate. This period includes a time in U.S. history where housing prices were at an all-time high, while interest rates were the lowest they had been in nearly 50 years (NBER, n.d.). The unemployment rates were also the lowest they had been in nearly 40 years with the year 2000 being the only exception during this time (NBER, n.d.).

Another significant increase in the military propensity rate took place following this 2007 low when the rate jumped from 8% in December 2007 to 12% the following December 2008, with this period coinciding with the Great Recession (NBER, n.d.). Since this increase in military propensity, however, the rates have continued to fluctuate, but have remained fairly stable through present with the most recent surveys indicating a slight drop. During this same time period, the economy has shown recovery from the Great Recession, but the progress has taken place slowly (NBER, n.d.). Individuals seem to be waiting to see what happens next with the economy before deciding on what to pursue for employment.

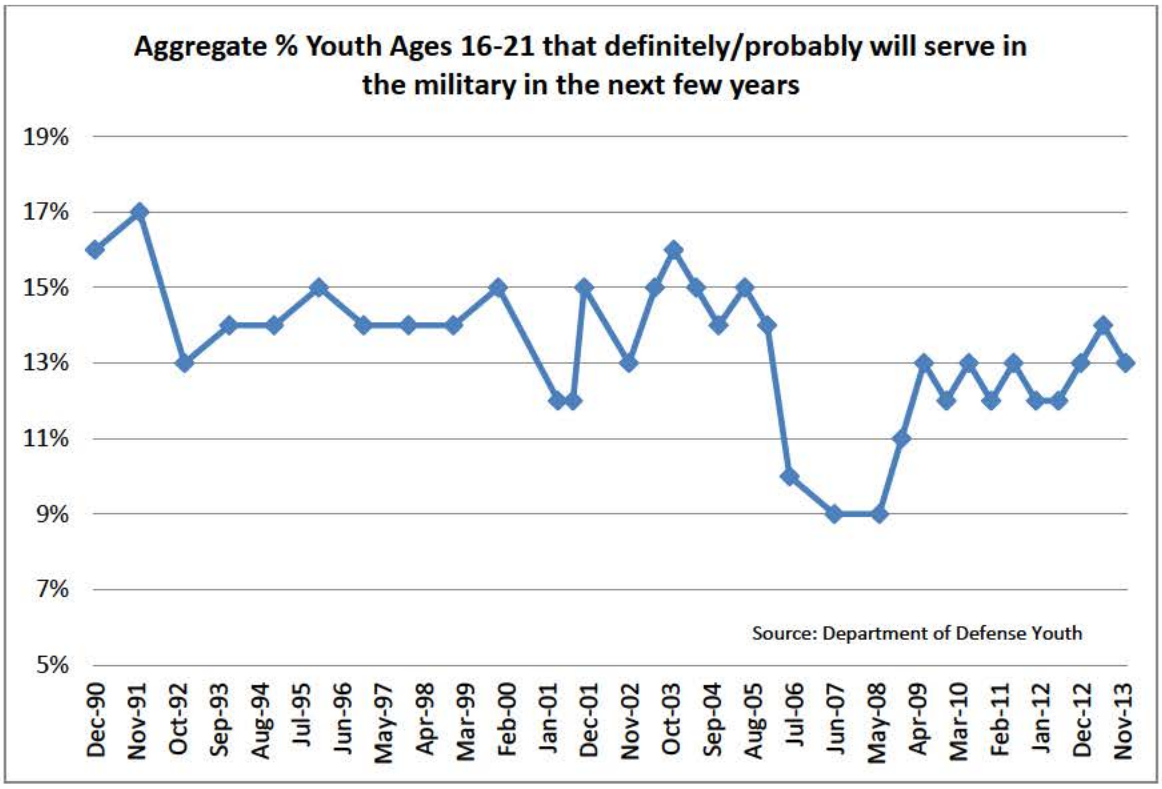

Figure 3. Historical General Military Propensity by Gender since 1984 (after JAMRS, 2014)

E. QUALITY HISTORY

While meeting recruiting goals for accessions is a top priority, the goal is to recruit "the best and brightest young men and women" and to "to deliver the highest quality Sailors to the fleet," as stated by Commander, Navy Recruiting Command on the CNRC website (2013). According to the March 2014 JAMRS State of the Recruiting Market, over the past few years, the military has experienced all-time highs in the quality of active-duty accessions, and these highs are attributed to the difficult employment environment. Coming as no surprise, when recruiting targets were missed in 1998 and 1999, a decline in the quality of recruits from the early 1990s was noted, as well, with economic growth being higher and unemployment rates lower than at any time since the 1960s (Warner, Simon, & Payne, 2010).

In general, trends in accession quality have reflected trends in youths' concerns about being able to find a full-time job. Current indicators show that the proportion of

youth who perceive difficulty in finding a job is decreasing, and with perceptions of the economy improving, many Services are already reporting decreases in accession quality. With data from the JAMRS New Recruit study showing that youth of higher quality are most sensitive to economic pressures, the proportion of high-quality enlistees who reported that the economy made them more like to enlist has been slowly decreasing over the previous year as shown in Figure 4.

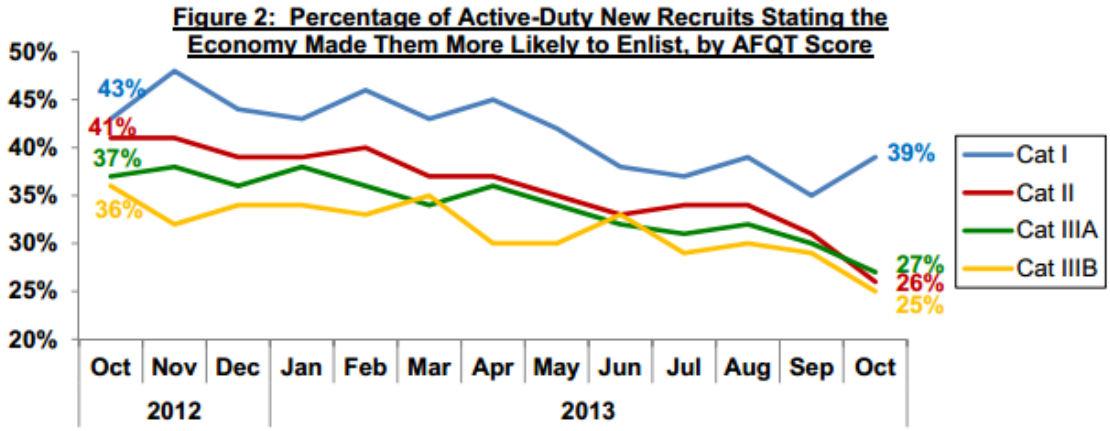

Figure 4. Percentage of Active-Duty New Recruits Stating the Economy Made Them More Likely to Enlist, by AFQT score (from CNRC, n.d.)

The determination of recruit quality is made based on the combination of a recruit's attainment of a high school diploma and the recruit's Armed Forces Qualification Test (AFQT) score. Recruits are then placed into categories based on this quality determination. Recruits scoring 93–99 on the AFQT are grouped into Category I. Those scoring between 65 and 92 are grouped into Category II and those scoring between 50 and 64 are grouped into Category IIIA. Those scoring less than 50, but at least 35 are placed into Category IIIB, with an AFQT score of 35 being the minimum score the Navy accepts (CNRC).

All of the recruits scoring 50 and above on the AFQT are then grouped by the Navy into various cells. These cells characterize specific trends of the recruits that fall into the category. Recruits who fall into Categories I, II, and IIIA, and that have attained their high school diploma are grouped into the A-cell, while the recruits in these

categories that have not attained their diploma are grouped into a B-cell. Recruits in Category IIIB that have attained their diploma are grouped in the Cu-cell, and those who have not attained a diploma are grouped in the D-cell (see Figure 5).

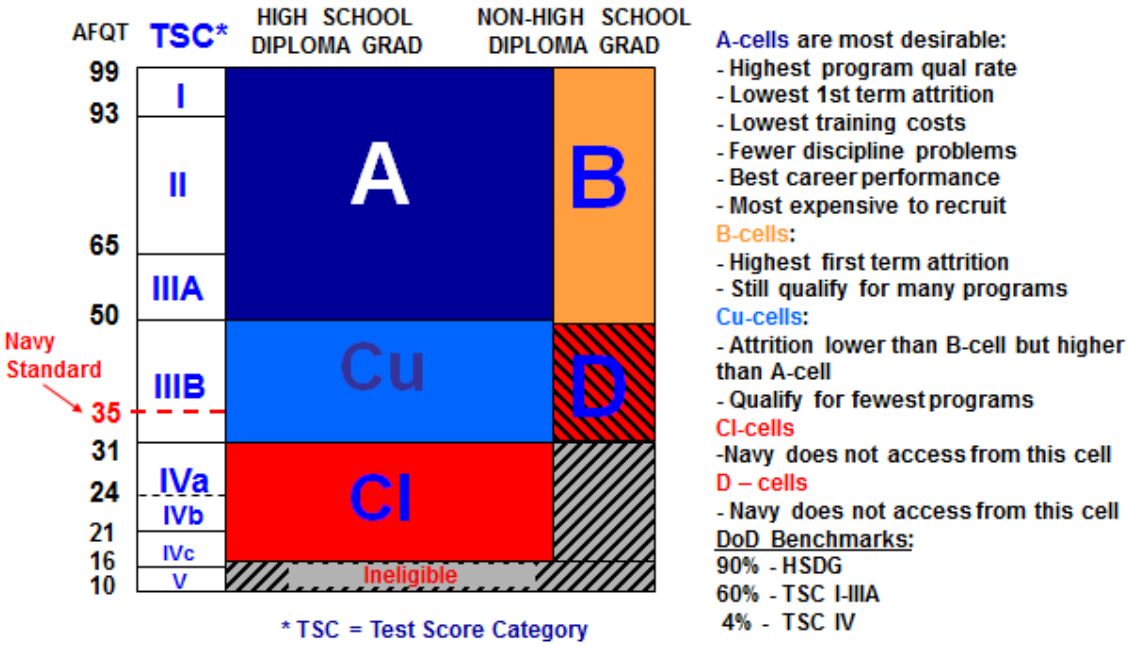

Figure 5. Navy recruiting Quality Standards (from CNRC, n.d.)

The traits defined in these cells are what make quality recruits so important to the Navy. As shown in Figure 5, A-cells are most desirable because they have the highest program qualification rate, lowest first term attrition, lowest training costs, fewer discipline problems, and have the best career performance. Individuals in the A-cell are the most expensive to recruit. However, once these individuals are accessed, they cost less in the future by way of what the aforementioned traits entail. Having the lowest attrition rates and training costs save the Navy money it otherwise would have had to spend on accessing more recruits to compensate for expected attrition and it cuts down on the costs associated with retraining recruits.

Recruits falling into B-cells qualify for many of the programs A-cell recruits do in that they share similar AFQT scores – a precursor for many Navy ratings. B-cell recruits, however, have the highest first term attrition rate of all the categories the Navy accesses

(CNRC, 2014). An individual completing a high school diploma illustrates a demonstration of persistence and ability to complete a task that has been started. Attaining a diploma is not completely indicative of one's ability to complete an enlistment since various factors lead to individuals not attaining their diplomas. However, B-cell recruits not finishing high school can be correlated to their being less likely to finishing an enlistment term as well.

Recruits in the Cu-cell have higher attrition rates than A-cell recruits, but actually have lower attrition rates than B-cell recruits. This again can be attributed to the correlation that goes along with the persistence and the ability to complete a task begun, similar to that of attaining a diploma. The downside associated with accessing recruits from the Cu-cell is that these recruits qualify for the fewest programs; therefore, the use of these accessions can be extremely limited once they are accessed. While it seems to simply make sense to field the highest quality recruits to deliver the highest quality results, the Navy's breakdown of the cells exhibit that high quality recruits, though they may cost more to recruit, save money by avoiding the future costs that go along with accessing recruits from lower cells.

F. OTHER FACTORS AFFECTING RECRUITING

1. College Effect

Along with the effect that the economy has on recruiting, another major challenge the Navy has to overcome is that of youth going to college. According to a report in the Journal of Behavioral Studies in Business, for Generation Z, those born after 1994, education is valued as a means of gaining security. It states that, "Instant access to the Web has bolstered respect for knowledge with 83% of 8–12 year olds saying, 'it's cool to be smart'' (Williams & Page, 2011). With education valued so heavily at such an early age, being able to appeal to this aspect of today's generation becomes more and more critical to recruiting success.

Relative returns to college education rose rapidly in the 1990s, resulting in tough competition for recruits from the college market and subsequent skilled civilian employment. At a time that the military is demanding a greater fraction of high quality

recruits, relatively more high quality youth are attending post-secondary institutions. Youth interest in enlisting has dropped, while youth interest in attending college has grown (Asch, Kilburn, & Klerman, 1999). Also, as the economy improves, families are becoming more able to afford college offsets (Asch, Hosek, Arkes, Fair, Sharp, & Totten, 2002). College costs have increased somewhat faster over the last decade than they did over the previous decade, College Board data shows (Leonhardt, 2013), and this fact may also play into recent increase in recruit quality.

2. Patriotism Effect

An effect whose impact on recruiting is extremely difficult to measure is that of patriotism. Following Operation Desert Storm which ended in 1991, recruiting was at an all-time high. In the months following the attacks of 9/11, the propensity to enlist saw a significant spike as well. An attribute both periods shared was that both periods took place around a recession. With a recession being in play during periods that also would appeal to American's patriotism, one would imagine that patriotism played a factor. However, it cannot be determined whether the economy or patriotism played a larger role.

G. PREVIOUS RESEARCH

Previous studies researching the impact of regional conditions on recruiting markets include Arkes and Kilburn (2005), Murphy (1999), McNown, Udis, and Ash (1980), Dale and Gilroy (1983), and Brown (1985). The study by Murphy examined data at the county level while the other studies all examined data at the state level, with most using enlistments as a percent of population as the dependent variable. The study by Arkes and Kilburn was unique from the others in that it also examined the impact of policy on reserve recruiting as well.

Arkes and Kilburn (2005) conducted a study of reserve recruiting with the goal of improving the Defense Department's ability to forecast supply and foreshadow potential recruiting problems. As with the active forces who struggled meeting recruiting goals in the late 1990s, the reserve forces struggled as well during this period, facing many of the same challenges of active force recruiting. This study sought to specify a model that

identified the relationships between different variables and the effects of these variables on recruiting outcomes.

Using data from 50 states and the District of Columbia for the years 1992 through 1999, Arkes and Kilburn developed two separate models in this study—one for those individuals with prior military service and one for those without prior service (2005). Similar to this study, they examined the effects of economic, demographic, and "influencer" variables on reserve recruiting. They also used variables such as the availability of merit-based scholarships to measure the challenges colleges pose, and policy variables such as the availability of state educational incentive programs for members of the National Guard to measure the effect of policy on reserve recruiting (Arkes & Kilburn, 2005).

Of the two models Arkes and Kilburn used in their study, the Non-Prior-Service model is most similar to this study in that as with active duty applicants, individuals without prior military presumably choose between entering active duty, entering the reserves, or not enlisting in the military. Estimating a grouped multinomial logit model, they used the dependent variables of the fraction of eligible high-quality young people who enlist in active duty, the fraction of eligible high-quality young people who enlist in the reserves, and the fraction of eligible high-quality young people who do not enlist in either active duty or the reserves (Arkes & Kilburn, 2005).

For explanatory variables, they used annual state unemployment rates, median wages for men with just a high school diploma, and median wages for men with four years of college and no more as economic variables. They also used demographic variables such as race and ethnicity. For influencer variables, they used the fraction of the population in a state and year aged 25 to 65 who are veterans, as well as, those in the same age group with a college degree to account for the differences in the number of influencers with college experience (Arkes & Kilburn, 2005).

With the focus of the study being on reserve recruiting, a variable indicating the percentage of 18 to 24-year-olds who are married was used to account responsibilities in households that would likely be a competing use of time to joining the reserves (Arkes &

Kilburn, 2005). They also included state and year dummy variables to allow the ability to capture state-specific effect that are not captured by the other variables in the model and do not vary over time.

As with most studies, the estimates on unemployment rate were found to be statistically significant with a one percentage point increase in the unemployment rate being estimated to increase the number of reserve recruits by almost 7 percent (Arkes & Kilburn, 2005). While not many of the other economic and demographic variables were found to have considerable effects on recruiting outcomes, states with more minorities were found to produce more recruits, all else held constant.

Similar to this study, Murphy's study examined the effect of the economy at the county level (1999). In this study, the author used individual applicant data for all individuals applying to the Armed Forces for the years 1993–1995. From this data set, the specific county/state for each applicant that applied for enlistment into the military was sorted. This data was then regressed against county-level economic variables with separate regression models being developed for each of the three years of data, possibly introducing major biases due to using cross-sectional models. Murphy then pooled the three years of data and discarded demographic variables that were not available for all three years (Murphy, 1999).

A fixed effects model was then used to incorporate county-level dummy variables into the model and allowing for economic effects in a given county for that period of time while holding constant any unobserved effects that are constant across counties. This study found the coefficient estimates on unemployment to be statistically significant with all estimations of the fixed effects models indicating that the unemployment rate at the county-level impacts recruiting the same way it does at the national level (Murphy, 1999).

The study done by McNown, Udis, and Ash (1980) was conducted at a time in history when the AVF was considered a failure by high-ranking military officers, congressmen, and academic sociologists. During this period, recruit quality was also a major concern (McNown et al., 1980).

The study reports on unemployment and relative pay elasticities for total non-prior service (NPS) accessions into the military calculated from semiannual, time series data from the first quarter of 1968 through the second quarter of 1976. With conscription still in effect over a large portion of their sample, total accession data was used to model NPS accessions by race and service (McNown et al., 1980).

Findings of the study indicate significant pay elasticities with unemployment surprisingly being found to be statistically insignificant for enlistment rates or accession rates. Unemployment was found to be statistically insignificant even at the 35 percent significance level, with the estimated coefficient having the wrong estimated sign in 7 of 20 cases, including Navy enlistment and accession rates for all males, as well as nonwhite males for DOD, Army, and Marine Corps enlistment and accession rates. The authors view these incorrect signs as further evidence of insignificance rather than as an indication of model misspecification (McNown et al., 1980).

Dale and Gilroy (1983), focusing specifically on U.S. Army enlistments, sought to quantify the relationship between enlistments of NPS high school graduates and the unemployment rate. Dale and Gilroy defined the dependent variable as the total number of individuals that had signed contracts and had now accessed plus delayed entry program entrants in a given month as the numerator, unlike other studies that have used only accessions in the numerator. In the denominator, they used the relevant data of the state's civilian population of 16 to 19-year old males. The data obtained covered the time period from October 1975 to March 1982 and included the number of enlistments and contracts of NPS high school male graduates in the military services. A linear functional form was developed with unemployment (lagged two and four months) being a key independent variable (Dale & Gilroy, 1983).

This study found a large effect on military enlistments in pay and unemployment with a rise in the unemployment rate leading to a substantial increase in Army enlistments of male NPS high school graduates (Dale & Gilroy, 1983). They also found that a one-time transient shock to the system caused by a pay freeze would have a lasting effect on enlistment levels, causing enlistment levels to drop significantly. It was also

determined that non-economic factors, as well as, educational benefits played significant roles in individuals' decisions to enlist (Dale & Gilroy, 1983).

Brown (1985) measured the effects of economic factors on Army enlistments of NPS high school graduates using geographic variation over the period 1975–1982. Brown used multiple-regression and pooled cross-section/time-series models. Due to the author having the ability to concentrate his empirical research on the period since the inception of the AVF, the study, at the time, was considered an improvement on previous similar studies (Brown, 1985).

The dependent variables in this study are ratios of the number of contracts signed by male NPS Army enlistees to the enlistment age population (Brown, 1985). The recruits analyzed fell into one of four categories: total enlistees, high school graduates, those recruits in Categories I-IIIA of the AFQT, and Categories I-IIIA high school graduates. The independent variables consisted of basic military compensation, educational benefits, military pay relative to civilian pay, total earnings, and unemployment rate (Brown, 1985).

The major findings of this study were that for high quality enlistees, a 10 percent increase in military pay raises the supply of enlistees by roughly 10 percent. A 10 percent increase in the unemployment rate increases the number of high-quality enlistees by about 6 percent – quite a change from previous studies where the unemployment rate was found to not be statistically significant or only slightly significant (Brown, 1985).

Similar to each of these studies, this study explores the effect the economy has on military recruiting. With the exception of the Arkes and Kilburn and the Murphy studies, the authors used data from the Army for analysis while the Arkes and Kilburn and Murphy studies used data from all military services, with Arkes and Kilburn also using reserve forces data. This study will only focus on data on Navy applicants. Also, the Murphy study examined the economic effect on recruiting at the county level while the other studies examined the economic effect at the state levels. The most significant difference between this study and Murphy's is that this study also seeks to determine if

the state or county unemployment rate provides a better predictor for Navy recruiting, as well as, if there is another economic variable that better predicts recruiting.

H. SUMMARY

This chapter has discussed the background of Navy recruiting, the U.S. economic conditions and the propensity to enlist in the military from 1991–2014, as well as quality history and other factors that also affect recruiting. It has also reviewed studies similar to this research that have examined the effect the economy has on military recruiting. The next chapter will discuss the data and methodology used in this study.

III. DATA AND METHODOLOGY

A. OVERVIEW

This chapter describes the data, variables, and methodology used to analyze the effects that the economy has on Navy recruiting. The data for this research were gathered from four different sources: the Defense Manpower Data Center, the Bureau of Labor statistics (BLS), Integrated Public Use Microdata Series Current Population Survey (IPUMS-CPS), and the Census Bureau.

1. Defense Manpower Data Center

For Navy recruiting data, the Defense Manpower Data Center (DMDC) provided information on all Navy recruiting applicants from the years 1990–2014. This information included basic demographic information on the applicants such as age, sex, race, as well as the recruits' home of record state and county, AFQT scores, education levels, application and accession dates. This data provided a total of 2,445,994 observations. The data were then aggregated into two separate samples—one at the county level and one at the state level. In these samples, the sum of the total number of applicants for a specific county or state was grouped into one observation per year. Because the latest applicant data given were for September 2014, all applicants for 2014 were dropped.

2. Bureau of Labor Statistics

The second data source used, BLS, provided the economic data for the study. From the BLS, state and county unemployment rates and state employment-to-population ratios were collected for the years 1990–2014. Each state and county was identified by a five-digit Federal Information Processing (FIPS) code, which uniquely identifies counties, county equivalents, and states in the United States. These unemployment files contained data on the monthly and annual unemployment rates, along with the total number of people employed, the total number of people unemployed, and the total number of people in the civilian labor force for each year. The monthly data were

dropped for each state and county and only the annual unemployment rates were used in this study. According to BLS, these unemployment estimates are derived from a variety of sources including Current Population Survey (CPS), Current Employment Statistics Surveys, Quarterly Census of Employment and Wages, various programs at the Census Bureau, and unemployment insurance claims data from the state workforce agencies.

The BLS file containing the employment-to-population ratio contained data for each state, District of Columbia, Los Angeles County, and New York City. For each observation, it provided the civilian non-institutional population, total civilian labor force population, total and percentage of employed, and the total and percentage of unemployed. The employment-to-population ratio is the number of employed divided by the total civilian non-institutional population. This percentage was used for analysis.

3. Integrated Public Use Microdata Series Current Population Survey

The third data source, IPUMS-CPS, provided county level demographic data for this study. This data set contained a total of 4,451,674 observations, providing county level data on age, race, educational attainment, and veteran status. For the variables obtained from this data, the interest was with the population age 25 and older to account for the possible effect that influencers such as parents, teachers, and coaches have on recruiting. Once all observations younger than the age of 25 were dropped, 2,769,844 observations remained.

Each observation was identified by its state and the county was identified by its FIPS code. While every observation provided a state, a FIPS code was not provided for the county of each observation. Without having any other means of determining what county an observation had come from, all observations that did not include a FIPS code were dropped before conducting the county level analysis, leaving a total of 913,736.

Educational attainment was broken down into categories that indicated the highest level of education completed. For this study, the interest is in those adults who have obtained a bachelor's degree or greater. A dummy variable was generated that included all observations that met this criterion.

For the veteran status variable, the responses of "yes," "no service," and missing were given, with 4,183 of the observations missing veteran status. To account for the observations that were missing, a dummy variable for veteran was generated that only included those observations whose responses were "yes."

All of the data obtained from IPUMS-CPS were aggregated by state and county. Each observation in the data is weighted with some records weighing more cases than others as some persons and households with some characteristics are over-represented in the samples, while others are underrepresented. This weight was used when aggregating the data to best accurately represent the data provided for each county and state.

4. Census Bureau

The fourth data source, Census Bureau, provided population data. This data broke down the population of age ranges into groups, with each group covering a span of five years. For this study, the ages of 15–19 were used as a proxy for the prime recruiting market for the military, which are ages 17–21. While the chosen age range is not the exact same as that of the prime recruiting age range, it represents an age range similar to that of the DMDC data with the prime recruiting market ages 17–21 making up nearly 75% of the applicants received. Since this proportion is constant across all states and counties, the measurement error will be the same for all.

B. DEFINITION OF DEPENDENT VARIABLES

Multiple dependent variables are used in this study to account for various ways the economy affects Navy recruiting. First, the application rate will be used as a means for examining the effect that the economy has on applicants. While the number of applicants would indicate the supply of applicants, the applicant rate will provide a measure that allows comparisons to be made across the populations of different counties and states. In order to determine the applicant rate, the number of applicants of a given county or state in a given year is divided by the population of 15–19 year olds for that same year.

A second dependent variable used is the accession rate, which is the number of accessions in a county or state in a given year divided by the population of 15–19 year olds for that same year. This accession rate allows for analysis of how accession rates change from year to year.

Military recruit quality has been at an all-time high over the past few years (JAMRS, 2014). To examine the effect that the economy has had on high-quality recruits, the dependent variables high-quality applicant rate and high-quality accession rate are used, where the total number of high-quality applicants for a given year in a county or state is divided by the population of 15–19 year olds for that same year, and the total number of high-quality accessions for a given year in a county or state is divided by the population of 15–19 year olds for that same year.

Tables 1 and 2 provide the descriptive statistics of the dependent variables used in the study. The rates are all weighted to where they are equal to the averages per 1000 individuals. The average number of Navy applicants in a state in a year is about 4.6, while this number is slightly higher at the county level, equaling 5 Navy applicants per 1000 individuals. The accession rate at the state level averages about 1.8 Navy accessions per year, while the average at the county level is about 2.3. High-quality applicants and accessions at the state level are 2.5 and 1.2 per 1000, respectively, while these numbers at the county level are 2.7 and 1.5, respectively.

Table 1. State Dependent Variable Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Applicant Rate	1173	4.595	1.838	0.777	11.490
Accession Rate	1173	1.828	0.681	0.347	4.256
High-Quality Applicant Rate	1173	2.529	1.003	0.494	7.149
High-Quality Accession Rate	1173	1.168	0.438	0.129	2.850

Table 2. County Dependent Variable Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Applicant Rate	50060	5.000	20.379	0.002	968.010
Accession Rate	50060	2.310	5.552	0.000	333.333
High-Quality Applicant Rate	50060	2.734	11.115	0.000	577.527
High-Quality Accession Rate	50060	1.471	3.730	0.000	333.333

C. EXPLANATORY VARIABLES

1. Economic Variables

The focus of this study is on the effect of the economy on Navy recruiting. In order to test the effect of the economy, this study uses the economic variables of unemployment rate and the employment to population ratio. The unemployment rate is defined as those individuals who are unemployed but are still actively seeking employment divided by the labor force. The unemployment rate is used in most studies as an indicator of economic health, and has often indicated that with higher unemployment rates, higher numbers of applicants to the military are experienced (see Arkes and Kilburn, 2005; Warner, Simon and Payne, 2010; Murphy, 1999; Brown, 1985). This variable is the primary economic variable used in this study to determine the effect of the economy on Navy recruiting. As with previous studies, the unemployment rate is expected to have an impact on recruiting as it can be expected that as the unemployment rate rises, the availability of jobs in the civilian sector falls, and individuals turn to the military for employment.

In order to test whether there is another variable that can better predict the effect of the economy on recruiting, the variable employment-to-population ratio is also used. This variable is defined as the number of employed divided by the total civilian non-institutional population age 16 and older. While the unemployment rate provides a reflection of those who are actively seeking work within the labor force, the employment to population ratio takes into account the population of individuals who are not subjected to the "discouraged workers," who are individuals who have given up looking for work under the belief that there are no jobs available. This variable has the potential to affect the dependent variables, and it is expected that higher employment-to-population ratios will lead to lower applicant and accession rates. The employment to population ratio is

only tested at the state level in this study, as the data for this variable is not provided by BLS at the county level.

2. Black, White, Asian, and Other Race Population Percentages

Demographic factors also offer another important influence on recruiting into the military. The rates established in this study are as the number in each race group divided by the total county or state population. Blacks are generally overrepresented in the military, while Asians, the fastest growing race or ethnic group in the United States are generally underrepresented. In FY2013, 5.4 percent of the 18- to 24-year-old population was Asian, while non-prior service active component accessions were only 3.8 percent (Center for Naval Analyses, 2013). With this knowledge, it would be expected that with an increase in the population share for blacks, there will be higher rates of applications and accessions, as well as, increases in the high-quality rates. However, with an increase in the population share for Asians, it is expected that there will be a decrease in the rates of applicants, accessions, and high-quality applicant and accession rates.

3. Bachelor's Degree

To account for the influence of those who serve as role models in helping shape an individual's post-high school plans, a variable for college degree is used. This variable measures the percentage of individuals in a county or state who are 25 and older and also have obtained a bachelor's degree or higher. It is expected that higher rates of adults with a bachelor's degree will have a negative impact on recruiting, as one would expect the individuals of a region to attain similar education levels of the adults in that region. Also, education can be correlated to income, so even with the rise in college costs that have recently occurred, those with higher levels of education are likely to have children who also attend college, negatively affecting Navy recruiting.

4. Veteran Population Rate

This variable measures the percentage of veterans ages 25 and older in a county or state. Warner, Simon, and Payne found in their 2003 study that a declining veteran population was an important factor in explaining the decline in enlistments that took

place in the late 1990s. In this study, it is expected that the veteran population rate will have a positive impact on Navy recruiting, meaning that the higher the veteran population rate, the higher the rates of applications and accessions as well.

5. Descriptive Statistics

Tables 3 and 4 display the descriptive statistics of the independent variables for the state and county levels. The average unemployment rate at the state level over the years of 1991 to 2013 is 5.7 percent, while the county unemployment rates average 6.3 percent. The employment to population ratio was only available for the state level, and averaged 63.2 percent for the years studied.

The black, white, and Asian population rates are 9.7, 84.5, and 1.8 percent, respectively at the state level. At the county level, the numbers are similar, with the population rate of blacks increasing to 10.4 percent, whites decreasing slightly to 84.5 percent, and Asians increasing to 2.6 percent.

The population rate of having a bachelor's degree increased from 25.7 percent at the state level to 28.9 percent at the county level. The population rate of veterans was found to average 13.9 percent at the state level and 12.8% at the county level.

Table 3. State Independent Variable Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Unemployment Rate	1173	0.057	0.0193	0.023	0.138
Employment to Pop Ratio	1173	0.632	0.0452	0.487	0.733
Black Population Rate	1173	0.097	0.1071	0.000	0.667
White Population Rate	1173	0.845	0.1339	0.212	0.997
Asian Population Rate	1173	0.018	0.0509	0.000	0.537
Race Other Population Rate	1173	0.040	0.0745	0.002	0.718
Percent Bachelor Degree	1173	0.257	0.0716	0.041	0.605
Percent Vet Rate	1173	0.139	0.0285	0.055	0.224

Table 4. County Independent Variable Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Unemployment Rate	50060	0.063	0.028	0.007	0.332
Black Population Rate	4510	0.104	0.130	0.000	0.885
White Population Rate	4510	0.839	0.152	0.093	1.000
Asian Population Rate	4510	0.026	0.055	0.000	0.615
Race Other Population Rate	4510	0.031	0.057	0.000	0.782
Percent Bachelor Degree	4510	0.289	0.126	0.000	1.000
Percent Vet Rate	4510	0.128	0.056	0.000	0.498

D. MODEL SPECIFICATION

A potential recruit's decision to apply for or join the military is potentially affected by the current economic situation. As a means of examining the impact that the explanatory variables have on the applicant and accession rates, as well as on the high-quality rates, a fixed effects model is used. The use of fixed effects models provides the opportunity to create dummies to capture the individual and time effects on counties and states over the years examined. This model allows for controlling for the unobserved fixed effects that take place in the state or county over the years being examined. The fixed effects estimation model used is:

$$Y_{jt} = X_{jt}\,\beta_1 + \gamma_{2*}(E_{jt}) + a_j + v_t + \varepsilon_{jt}$$

The subscript j refers to the individual county or state. The subscript t refers to the time period which is year in this study. The variable Y represents one of the dependent variables including applicant rate, accession rate, high-quality applicant rate, and high-quality accession rate. The X includes the control variables black population rate, white population rate, Asian population rate, and the percentage of adults with a bachelor's degree, and the percentage of adults that have identified themselves as veterans. The E_{jt} represents the county or state economic variables used in this study of unemployment rate or employment-to-population ratio. Only one of the economic variables in the state models was used in a regression at a time to avoid issues with multicollinearity. The ε_{jt} represents the error term that varies with counties or states and the time period. The a_j represents the individual county or state fixed effects, including unobserved individual characteristics that do not change over time, and the v_t represents the year fixed effects.

E. DATA LIMITATIONS

A limitation faced in this study lies in the data retrieved from DMDC. While the data covers the states and counties from 1990–2013, 29.2% of the observations did not begin to give county level data until the late 1990s. For these observations, rather than providing an actual FIPS code or a county name, they would provide a generic FIPS code. For example, a majority of the counties in Florida are simply listed as 120FL. While the prefix of 12 is the correct prefix for the Florida state FIPS code, the last three digits should also be numbers to identify which county in Florida this observation belongs to. Without a means of determining which counties a number of the observations belonged to, these observations were dropped for the county level analysis. The observations were still used if they provided a state and an application year.

Another issue that came along with the DMDC data was that the state-dependent variable rates were nearly twice as high in the early 1990s as they were in the mid-1990s as shown in Figure 6. At the county level, rates were about twelve times higher in the early 1990s than they were in the mid-1990s as seen in Figure 7. When examining the data more closely, it appears that early on, DMDC only reported data from larger counties, and then beginning around 1997, the majority of the counties were being reported, which also coincides with when the various rates leveled out.

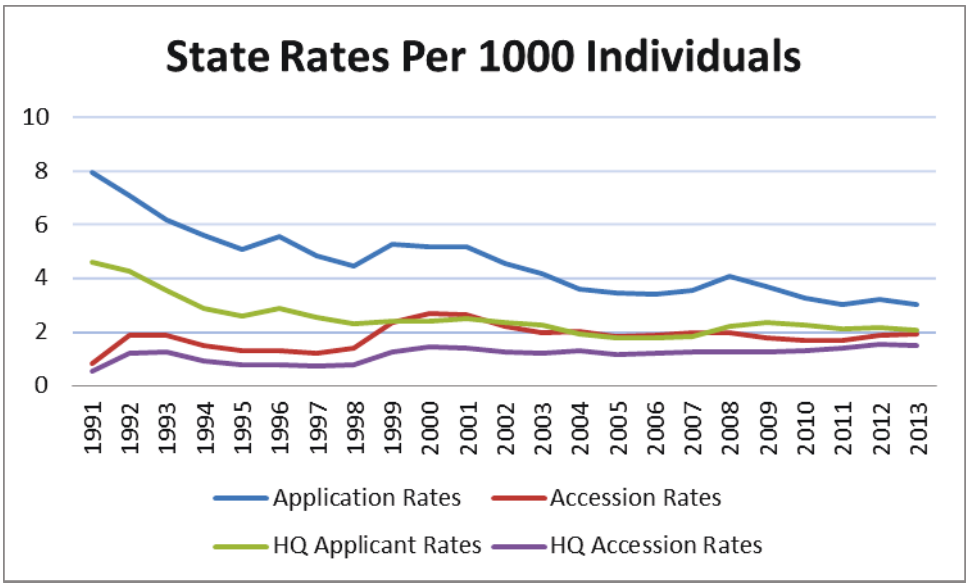

Figure 6. State Dependent Variable Rates per 1000 Individuals

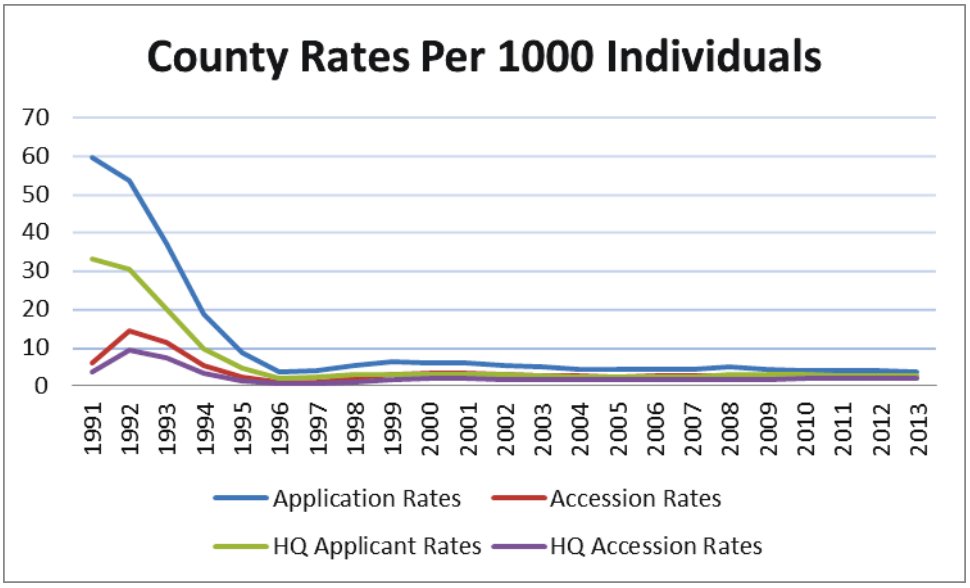

Figure 7. County Dependent Variable Rates per 1000 Individuals

Along with the impact that missing data on smaller counties has on the analysis, smaller counties may also lead to less accurate economic variables due to the introduction of sampling error bias. With sampling bias error, the smaller counties may lead to the estimates on the economic variables showing a downward bias. This sampling bias error

may also take place in the states as well, with there being significant differences in the populations of states.

In order to adapt to the impact that various county sizes have on the dependent variables, weighted and population conditioned fixed effects models were also run. In the population conditioned models, separate regressions are run for county populations of 15- to 19-year-olds greater than 1,000, greater than 2,000, greater than 5,000, greater than 10,000, and greater than 15,000 individuals. In the weighted models, regressions using a weight of the square root of the population of 15- to 19-year-olds in each state and county were also run.

Another limitation came with the data retrieved from CPS-IPUMS. While weights were attached to each observation to give the observation a more accurate representation, the data did not provide the demographic information for each county used in this study. To account for the effect of the economic variables on counties, an analysis was conducted on the counties that also included demographic data, and a separate analysis was conducted that only analyzes the effect of the economic variables on the county recruiting. All of the observations included a state, so the aggregated state values were used to conduct the analysis on individual states.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. RESULTS

A. INTRODUCTION

The objective of this research is to determine the effect that the economy has on Navy recruiting. By analyzing the multivariate regression results, we can determine whether we can better predict Navy recruiting by doing a state-level or county level analysis, and examine whether there is another economic variable that better predicts the effect of the economy on recruiting other than unemployment rates. This chapter discusses the state unemployment, state employment-to-population ratio, and county unemployment regression results.

B. STATE-LEVEL RESULTS

1. State Unemployment Rate

Table 5 provides the results of the primary and weighted state fixed effects models that contained the economic variable state unemployment rate. All of the explanatory variables indicated a statistically significant effect on all of the dependent variables examined (application rate, accession rate, high quality applicant rate, and high quality accession rate).

The state unemployment rate is associated with higher recruiting rates across all of the dependents variables. A one percentage point increase in the state unemployment rate is estimated to increase the state application rate by 0.131 applicants, the accession rate by 0.073 accessions, the high-quality applicant rate by 0.108 high-quality applicants, and the high-quality accession rate by 0.065 high-quality accessions. All of these increases are based on estimates per 1000 individuals and are statistically significant at the one percent level.

With variation in the sizes of the state populations observed, measurement error occurs due to sampling error bias in the estimation of the economic variables, leading to a downward bias. As a means of taking into account the significant differences in state populations, weighted models using a weight of the square root of the population of 15-

to 19-year-olds in each state were also run. When applying the weights to the models, the only difference of note from the primary models is that the coefficient estimates on the unemployment rate variable are all slightly less in the non-weighted models. For instance, the coefficient estimate on unemployment rate in the regression for applicant rate decreases from 0.131 to 0.119.

Of the race variables, the Asian population rate indicated a statistically significant effect on all four of the dependent variables tested. However, contrary to the hypothesis that the Asian population rate would negatively affect the dependent variables, it actually positively affected the dependent variables, all at the one percent level. The black population rate also is shown to increase the application rate at the five percent level, and when the weights are added, the coefficient is statistically significant at the one percent level, but it did not indicate changes in any of the other dependent variables.

Both adults who are veterans and adults who hold a bachelor's degree indicate a statistically significant effect, but in different regressions, with veterans impacting the applicant rates while bachelor's degrees impacting the accession rate. An increase in the percentage of adults who are veterans, as expected, increases both the applicant rate and high-quality applicant rate at the ten percent and five percent level, respectively. An increase in the percentage of adults with college degrees negatively affected accession rates, having a statistically significant effect on both the accession rate and the high-quality accession rate at the one percent level. When the weights are added, the coefficient estimates on veterans is no longer statistically significant for applicant rate and is now statistically significant at the ten percent level for high-quality applicant rate. For bachelor's degree, the effect on the high-quality applicant rate is now statistically significant at the ten percent level.

Table 5. State Unemployment: Results from the Primary and Weighted Fixed Effects Model

VARIABLES	Applicant Rate	Accession Rate	High-Quality Applicant Rate	High-Quality Accession Rate
Unemployment Rate	0.131***	0.073***	0.108***	0.065***
	(0.025)	(0.011)	(0.014)	(0.007)
Black Population Rate	0.034**	0.001	0.003	0.000
	(0.016)	(0.006)	(0.009)	(0.004)
Asian Population Rate	0.042***	0.023***	0.034***	0.016***
	(0.008)	(0.003)	(0.005)	(0.003)
Percentage of adults who are veterans	0.040*	0.001	0.037**	0.002
	(0.024)	(0.009)	(0.015)	(0.006)
Percentage of adults with a bachelor's degree	0.007	-0.017***	0.007	-0.010***
	(0.014)	(0.005)	(0.008)	(0.003)
Observations	1,173	1,173	1,173	1,173
R-squared	0.879	0.841	0.862	0.831
Weighted Models				
Unemployment Rate	0.119***	0.061***	0.099***	0.058***
	(0.023)	(0.010)	(0.013)	(0.007)
Black Population Rate	0.045***	-0.005	0.014	-0.004
	(0.016)	(0.007)	(0.009)	(0.005)
Asian Population Rate	0.031***	0.018***	0.031***	0.014***
	(0.008)	(0.003)	(0.004)	(0.002)
Percentage of adults who are veterans	0.016	-0.003	0.023*	-0.001
	(0.023)	(0.009)	(0.013)	(0.005)
Percentage of adults with a bachelor's degree	0.020	-0.011**	0.012*	-0.005
	(0.012)	(0.005)	(0.007)	(0.003)
Observations	1,173	1,173	1,173	1,173
R-squared	0.895	0.865	0.881	0.860

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. State Employment-to-Population Ratios

In order to test whether there was another variable that can better predict the effect of the economy on recruiting, a state fixed effects model was also run that regressed the employment-to-population ratio on the various dependent variables. Table 6 shows that the state employment-to-population ratios have similar effects on the

dependent variables that the unemployment rates have, but in the reverse direction as expected, since these numbers account for individuals who are employed. While a one percentage point increase in the unemployment rate led to an average increase of 0.131 in the applicant rate per 1000 individuals, the same increase in the employment-to-population ratio led to a decrease of 0.101 in the applicant rate. The effects on the accession rates were the exact same, but in opposite directions. The effects on high-quality were also similar to unemployment rates, but slightly lower with the employment-to-population causing decreases of 0.081 and 0.056 on the high-quality and high-quality accession rates, respectively. When applying weights to the models, as with the state unemployment rate, the coefficient estimates all remain statistically significant at the one percent level while decreasing slightly.

While the black population rate indicated a statistically significant effect on the applicant rate when tested with the unemployment rate, it no longer indicates a statistically significant effect when tested with the employment-to-population ratio. However, when applying the weights, it is statistically significant at the one percent level. The Asian population rate indicates similar effects on the dependent variables when tested with the employment-to-population ratio as when tested with the unemployment rate and the coefficient estimates slightly decrease when the weights are applied.

When testing veterans and adults with bachelor's degrees with the employment-to-population ratio, similar results are shown as when tested with the unemployment rate. However, the effect of veterans on the applicant rate is no longer statistically significant, while the effect on the high-quality applicant rate has dropped from 0.037 to 0.030. While the coefficient estimates on the adults with bachelor's degrees remained quite similar, the change to note is that the confidence level has dropped from the 99 percent to 95 percent for the accession rate, and from 99 percent to 90 percent for the high-quality accession rate. When the weights are applied, the coefficient estimates on veterans are no longer statistically significant, while the coefficient estimates on bachelor's degree are now statistically significant for applicant rate and high-quality applicant rate, but no longer significant for accession rate and high-quality accession rate.

Table 6. State Employment-to-Population: Results from the Fixed Effects Model

VARIABLES	Applicant Rate	Accession Rate	High-Quality Applicant Rate	High-Quality Accession Rate
Employment-to-population ratio	-0.101***	-0.073***	-0.081***	-0.056***
	(0.017)	(0.007)	(0.010)	(0.005)
Black	0.023	-0.008	-0.006	-0.006
	(0.016)	(0.006)	(0.009)	(0.004)
Asian	0.037***	0.020***	0.030***	0.014***
	(0.008)	(0.003)	(0.004)	(0.002)
Percentage of adults who are veterans	0.032	-0.004	0.030**	-0.003
	(0.024)	(0.009)	(0.015)	(0.006)
Percentage of adults with a bachelor's degree	0.013	-0.012**	0.012	-0.006*
	(0.014)	(0.005)	(0.008)	(0.003)
Observations	1,173	1,173	1,173	1,173
R-squared	0.880	0.848	0.862	0.837
Weighted Models				
Employment-to-population ratio	-0.083***	-0.060***	-0.063***	-0.046***
	(0.017)	(0.006)	(0.010)	(0.005)
Black	0.043***	-0.007	0.012	-0.005
	(0.016)	(0.006)	(0.009)	(0.004)
Asian	0.028***	0.016***	0.029***	0.012***
	(0.008)	(0.003)	(0.004)	(0.002)
Percentage of adults who are veterans	0.009	-0.007	0.017	-0.005
	(0.023)	(0.009)	(0.013)	(0.005)
Percentage of adults with a bachelor's degree	0.024*	-0.008	0.015**	-0.003
	(0.012)	(0.005)	(0.007)	(0.003)
Observations	1,173	1,173	1,173	1,173
R-squared	0.895	0.869	0.879	0.862

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

C. COUNTY-LEVEL RESULTS

Table 7 contains the results from the primary and the weighted county unemployment fixed effects models. The coefficient estimates for unemployment rate are found to be statistically significant for each outcome. When weights are applied to the models, the coefficient estimates continue to be statistically significant at the one percent

level, but have decreased slightly as was the case with the coefficients in the state unemployment rate models. None of the demographic variables are found to be statistically significant in the primary models, but the coefficient estimate on the Asian population rate is found to be statistically significant at the five percent level in the high-quality applicant rate regression when the weights are applied to the model.

Table 7. County Unemployment: Results from the Primary and Weighted Fixed Effects Model

VARIABLES	Applicant Rate	Accession Rate	High-Quality Applicant Rate	High-Quality Accession Rate
Unemployment rate	0.166***	0.073***	0.130***	0.068***
	(0.063)	(0.019)	(0.033)	(0.012)
Black	-0.033	-0.007	-0.015	-0.002
	(0.038)	(0.011)	(0.020)	(0.006)
Asian	0.006	-0.002	0.004	-0.002
	(0.007)	(0.003)	(0.004)	(0.002)
Percentage of adults who are veterans	0.030	0.007	0.016	0.005
	(0.028)	(0.008)	(0.015)	(0.005)
Percentage of adults with a bachelor's degree	-0.005	-0.002	-0.002	-0.001
	(0.006)	(0.002)	(0.003)	(0.001)
Observations	4,503	4,503	4,503	4,503
R-squared	0.343	0.533	0.357	0.574
Weighted				
Unemployment rate	0.097***	0.051***	0.097***	0.056***
	(0.029)	(0.010)	(0.016)	(0.007)
Black	-0.008	-0.000	-0.004	0.001
	(0.019)	(0.006)	(0.010)	(0.003)
Asian	0.005	-0.001	0.005**	-0.001
	(0.005)	(0.002)	(0.003)	(0.002)
Percentage of adults who are veterans	0.013	0.002	0.007	0.002
	(0.016)	(0.005)	(0.008)	(0.003)
Percentage of adults with a bachelor's degree	-0.004	-0.002	-0.001	-0.001
	(0.004)	(0.002)	(0.002)	(0.001)
Observations	4,503	4,503	4,503	4,503
R-squared	0.488	0.660	0.502	0.680

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tables 8 to 11 provide the results of the primary and population conditioned fixed effects models containing the demographic variables for the county level effects. For the primary model, only the unemployment rate is shown to have a statistically significant effect on the dependent variables. The results indicate that for an increase of one percentage point in the unemployment rate, the applicant rate increases by 0.166, the accession rate by 0.073, the high-quality applicant rate by 0.13, and the high-quality accession rate by 0.068. All of these increases indicate the change in 1000 individuals and are statistically significant at the one percent level.

With the significant variation in the sizes of the counties observed, measurement error occurs due to sampling error bias in the estimation of the unemployment rates. In order to account for the possibility of downward bias in the estimates due to this measurement error, population conditioned county fixed effects models were also run. These models conditioned for county populations of 15- to 19-year-olds greater than 5,000, 10,000, and 15,000. The results for the models containing all of the demographic variables are also displayed in Tables 8 –11.

Where populations are greater than 5,000, the coefficient estimates on the unemployment rates all drop, with the drop being nearly half of what the estimate was before conditioning for population. For instance, with no population control, the coefficient estimate on the unemployment rate was 0.166, but when conditioning for a population greater than 5,000, the coefficient estimate is now 0.084, indicating that the unemployment rate on populations greater than 5,000 has almost half the impact on the applicant rate than the unemployment rate when the population is not conditioned for. The coefficient is also nearly halved for the high-quality applicant rate at 5,000 as well. While there is also a decrease in the coefficients for unemployment rate for the accession rate and high-quality accession rate models, the decrease is not as dramatic as in the applicant models. This decrease comes as a surprise given that the downward bias from measurement error should be less, as the population size increased. Once the population size is increased to 10,000 and 15,000, the coefficients for unemployment continue to increase as expected.

Another change that took place when conditioning for populations in the models containing demographics was that the coefficient estimates on the demographic variables are now statistically significant in all the regressions. While none of the demographic variables had a statistically significant effect on the dependent variables in the models that did not control for population, the black and Asian population rates, and the percentage of adults with bachelor's degree also show a statistically significant effect, beginning with when the population was greater than 5,000.

When the sample was limited to counties with a population greater than 5,000, the coefficient estimates on the black population rate indicate increases in the dependent variables that are statistically significant at the one percent level. When greater than 10,000, increases in the black population rate lead to increases in the applicant and high-quality rates that are statistically significant at the one percent level, an increase in the accession rate statistically significant at the five percent level, and an increase in the high-quality accession rate statistically significant at the ten percent level. When greater than 15,000, the black population rate only indicates an effect on the accession rate with this effect statistically significant at the ten percent level.

The coefficient estimates on the Asian population rate indicate statistically significant effects on the applicant and high-quality applicant rates for populations greater than 15,000. This effect is statistically significant at the five percent level for applicant rate and at the one percent level for the high-quality applicant rate.

The only other variable indicating a statistically effect on the dependent variables was the percentage of adults with a bachelor's degree. This variable indicates that an increase in the percentage of adults with bachelor's degrees leads to a decrease in the applicant rate for populations greater than 10,000 and is statistically significant at the five percent level.

Table 8. County Applicant Rate: Results from Primary and Population Conditioned Fixed Effects Models

VARIABLES	Primary	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.166***	0.084***	0.073***	0.069***
	-0.063	-0.017	-0.018	-0.019
Black Population Rate	-0.033	0.014***	0.017***	0.009
	-0.038	-0.005	-0.005	-0.006
Asian Population Rate	0.006	0.003	0.004	0.009**
	-0.007	-0.005	-0.005	-0.004
Percentage of adults who are veterans	0.03	-0.009	-0.009	-0.003
	-0.028	-0.006	-0.007	-0.007
Percentage of adults with a bachelor's degree	-0.005	-0.006	-0.006**	-0.002
	-0.006	-0.003	-0.003	-0.004
Observations	4,503	4,482	3,963	2,866
R-squared	0.343	0.691	0.69	0.843

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9. County Accession Rate: Results from Primary and Population Conditioned Fixed Effects Models

VARIABLES	Primary	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.073***	0.050***	0.041***	0.040***
	-0.019	-0.009	-0.009	-0.009
Black Population Rate	-0.007	0.006**	0.006**	0.005*
	-0.011	-0.003	-0.003	-0.003
Asian Population Rate	-0.002	-0.003	-0.001	0.003
	-0.003	-0.002	-0.002	-0.002
Percentage of adults who are veterans	0.007	-0.004	-0.004	-0.005
	-0.008	-0.003	-0.003	-0.004
Percentage of adults with a bachelor's degree	-0.002	-0.003	-0.002	-0.001
	-0.002	-0.002	-0.002	-0.002
Observations	4,503	4,482	3,963	2,866
R-squared	0.533	0.774	0.787	0.843

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10. County High-Quality Applicant Rate: Results from Primary and Population Conditioned Fixed Effects Models

VARIABLES	Primary	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.130***	0.087***	0.083***	0.081***
	-0.033	-0.01	-0.01	-0.011
Black Population Rate	-0.015	0.010***	0.008***	0.001
	-0.02	-0.003	-0.003	-0.004
Asian Population Rate	0.004	0.003	0.003	0.006***
	-0.004	-0.003	-0.003	-0.002
Percentage of adults who are veterans	0.016	-0.004	-0.005	-0.002
	-0.015	-0.004	-0.004	-0.004
Percentage of adults with a bachelor's degree	-0.002	-0.002	-0.002	0.001
	-0.003	-0.002	-0.002	-0.002
Observations	4,503	4,482	3,963	2,866
R-squared	0.357	0.702	0.711	0.825

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 11. County High-Quality Accession Rate: Results from Primary and Population Conditioned Fixed Effects Models

VARIABLES	Primary	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.068***	0.055***	0.048***	0.049***
	-0.012	-0.006	-0.006	-0.006
Black Population Rate	-0.002	0.006***	0.004*	0.002
	-0.006	-0.002	-0.002	-0.002
Asian Population Rate	-0.002	-0.003	-0.002	0.001
	-0.002	-0.002	-0.002	-0.002
Percentage of adults who are veterans	0.005	-0.001	-0.002	-0.002
	-0.005	-0.002	-0.002	-0.003
Percentage of adults with a bachelor's degree	-0.001	-0.001	-0.001	0
	-0.001	-0.001	-0.001	-0.001
Observations	4,503	4,482	3,963	2,866
R-squared	0.574	0.753	0.771	0.82

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Tables 12 to 15 display the results of the fixed effects models for counties where unemployment is the only explanatory variable used. One of the first changes of note is that the number of observations immediately drops from 50,060 for models that include all counties to 38,216 for models where the county population is greater than 1,000. A decrease in the unemployment coefficient also takes place immediately, beginning with populations greater than 1,000, with the decrease being most dramatic for the applicant rate. Oddly, the coefficient for unemployment rate increased in each model when the population is greater than 2,000. Not only did these coefficients increase to being larger than they were when the population is greater than 1,000, they also are higher than in the models run without the population controls. Once the population is increased to greater than 5,000, the coefficient on unemployment rate continues to decrease in the models for each dependent variable as the population is increased.

Table 12. County Applicant Rate: Results from Primary and Population Conditioned Fixed Effects Model with Unemployment as only Explanatory Variable

VARIABLES	Primary	Pop > 1000	Pop > 2000	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0 263***	0.187**	0.370***	0.076***	0.073***	0.048***
	-0.085	-0.083	-0.113	-0.014	-0.019	-0.014
Observations	50,060	38,216	27,272	14,263	8,264	5,611
R-squared	0.355	0.308	0.296	0.566	0.619	0.815

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13. County Accession Rate: Results from Primary and Population Conditioned Fixed Effects Model with Unemployment as only Explanatory Variable

VARIABLES	Primary	Pop > 1000	Pop > 2000	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.109***	0.088***	0.122***	0.034***	0.032***	0.028***
	-0.02	-0.022	-0.03	-0.006	-0.007	-0.007
Observations	50,060	38,216	27,272	14,263	8,264	5,611
R-squared	0.339	0.309	0.306	0.696	0.755	0.822

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 14. County High-Quality Applicant Rate: Results from Primary and Population Conditioned Fixed Effects Model with Unemployment as only Explanatory Variable

VARIABLES	Primary	Pop > 1000	Pop > 2000	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.155***	0.132***	0.236***	0.075***	0.076***	0.066***
	-0.044	-0.048	-0.066	-0.007	-0.01	-0.008
Observations	50,060	38,216	27,272	14,263	8,264	5,611
R-squared	0.364	0.303	0.292	0.571	0.627	0.797

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 15. County High-Quality Accession Rate: Results from Primary and Population Conditioned Fixed Effects Model with Unemployment as only Explanatory Variable

VARIABLES	Primary	Pop > 1000	Pop > 2000	Pop > 5000	Pop > 10000	Pop > 15000
Unemployment Rate	0.090***	0.077***	0.097***	0.038***	0.039***	0.037***
	-0.014	-0.014	-0.02	-0.004	-0.004	-0.005
Observations	50,060	38,216	27,272	14,263	8,264	5,611
R-squared	0.345	0.301	0.3	0.667	0.737	0.796

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

D. MODEL COMPARISONS

In order to decide on which model best predicts Navy recruiting, I first compared the state fixed effects models for state unemployment rates and state employment-to-population ratios to determine if one of the variables does a better job of predicting the outcome of interest. Because the models are non-nested, I used the R-squared values along with the AIC and BIC values to examine the difference between the models. With the R-squared, AIC, and BIC values all being extremely close, regardless of the outcome of interest, it appears that both the state unemployment rate and the state employment-to-population ratios perform about the same.

When comparing the primary county fixed effects models with the weighted and population conditioned county fixed effects models, the conditioned fixed effects models have the highest R-squared values with these values increasing as the population size increases, and populations greater than 15,000 having the highest R-squared value in each case. This indicates that the population conditioned models with the populations greater than 15,000 do the best job of explaining more of the variation in the dependent variables and the best job of predicting the outcomes of the variables of interest.

To determine whether the demographic variables were needed or not, joint tests were conducted on each demographic variable included for each dependent variable, and the demographic variables were all found to be equal to zero in each case. Furthermore, with their p-values not being statistically significant, I cannot reject the null hypothesis that the demographic variables are jointly equal to zero, and therefore, they do not help with the predictability of the variables of interest. While the demographic variables do not seem to statistically effect the outcomes of the variables of interest, they do seem to be correlated with the unemployment rates as the coefficients on county unemployment rates are higher when the demographic variables are included than they are when the demographic variables are not included.

To compare the state fixed effects models to the county fixed effects models, I compared the p-values of the coefficients in the state models to those in the county models. In both the state and county models, the p-values of the coefficients are

extremely low and are statistically significant at the one percent level. With this being the case, it appears that state and county level fixed effects models also perform about the same, with neither doing a better job of predicting recruiting. The only true change that took place when comparing state unemployment rate, state employment-to-population, and county unemployment rate models is that the coefficient on the economic variable in each model is different, indicating that the magnitude of change in recruiting varies depending on the economic variable that is used.

E. SUMMARY

In conclusion, the unemployment rate was shown to have a major effect on the various dependent variables as expected on both the state and county levels. The state employment-to-population ratio was also shown to have a major effect on the various dependent variables as well, though a slightly less effect than that of the state unemployment rates. It appears that the state unemployment rate and the state employment-to-population ratio do equally well with predicting the outcomes of applicant rates, accession rates, high-quality applicant rates, and high-quality accession rates.

When deciding between county fixed effects models that contain all counties, the weighted models, and the population conditioned models, the population conditioned models do a the best job of predicting the outcomes of the variables of interest. While the models perform equally well with and without the demographic variables, they do not seem to be needed, but do appear to be correlated with the unemployment rates.

Of the various demographic variables tested at the state level, the Asian population rate variable turned out to be a surprise in that its sign was positive when it was expected to be negative. While none of the demographic variables were shown to have an effect on recruiting success at the county levels when all counties were included, the models controlling for county size did show demographic factors playing a role in recruiting success, but these effects were minimal and only had an effect when conditioning for certain population levels.

V. CONCLUSIONS

A. SUMMARY

Recruiting the best and brightest men and women remains essential to Navy mission readiness and success. While a number of factors will contribute to Navy recruiting success, having an understanding of the impact of these factors helps better prepare for the future. This study examines the impact that state and county economic variable rates have on Navy recruiting, while also examining whether there are economic variables other than the unemployment rate that can better predict recruiting.

B. CONCLUSIONS

Using state-level and county-level fixed effects models, I analyzed the effect that state unemployment rates, state employment-to-population ratios, and county unemployment rates have on Navy recruiting.

This analysis is important because having an accurate understanding of how the economy will affect future recruiting allows the Navy to better identify ways of coping with the constant change that takes place in the economy every few years so that mission readiness remains at high levels. The results of this analysis indicate that the economic variables of state unemployment rates, state employment-to-population ratios, and county unemployment rates all predict Navy recruiting equally well. It also surprisingly suggests that the demographic variables used, for the most part, have very little to no effect on Navy recruiting.

C. RECOMMENDATIONS

While I feel that this study served its purpose of understanding the effect that various economic variables have on Navy recruiting, I expected the demographic variables to have a larger impact on recruiting than the results suggest.

The minimal impact of the demographic variables could be linked to the fact that the demographic data which was retrieved from CPS-IPUMS contained so few observations when compared to the total number of county observations used in this

study. While the weights provide an increased level of accuracy, collecting more extensive county demographic data may show that county and state demographics do indeed play a larger role than the results of this study suggest.

The minimal effect that the education variable, percentage of adults with a bachelor's degree, yielded also comes as a surprising result when considering the ever increasing importance of education. While individuals are likely to be influenced by their role models to attend college, the cost of college also plays a role in college attendance. College costs may possibly have more of an impact on individuals with the desire to attend college actually being able to attend college, and therefore, a variable for college costs may have been better suited for determining the effect that pursuing higher education has on recruiting.

Other characteristics of a county could also be taken into consideration for examining the effect that the economy has on recruiting. When considering the effect that college costs have on college attendance, an economic factor that would have an impact on the ability to attend college would be the average earnings of an area. Counties that are more financially stable will likely not be as heavily affected by the college costs, meaning that a better understanding of the effects of college costs on recruiting may be found.

Also, variables such as housing starts and job growth could also be used in determining economic effects on recruiting. Along with the unemployment rates, new construction and job growth in areas also provide indicators of economic health. By also testing the effects of these variables on the dependent variables used in this study, I would be able to confirm that the results of the county unemployment rates are robust.

LIST OF REFERENCES

Arkes, J., & Kilburn, M. R. (2005). *Modeling reserve Recruiting: Estimates of enlistments* (MG-202). Santa Monica, CA: RAND. Retrieved from http://www.dtic.mil/dtic/tr/fulltext/u2/a439018.pdf

Asch, B., Hosek, J. R., Arkes, J., Fair, C. C., Sharp, J., & Totten, M. (2002). *Military recruiting and retention after the fiscal year 2000 military pay* (MR-1532-OSD). Santa Monica, CA: RAND. Retrieved from http://www.rand.org/content/dam/rand/pubs/monograph_reports/2005/MR1532.pdf.

Asch, B., Kilburn, M. R., & Klerman, J. A. (1999). *Attracting college bound youth in the military*: T*oward the development of new recruiting policy options* (MR-984-OSD). Santa Monica, CA: RAND. Retrieved from http://www.rand.org/pubs/monograph_reports/MR984.html.

Brown, Charles (1985, March). Military Enlistments: What can we learn from geographic variation? *American Economic Review, 75*(1), 228–234. Retrieved from http://www.nber.org/papers/w1261

Commander Navy Recruiting Command (CNRC). (n.d.). Brief history, command philosophy, and maps. Retrieved from http://www.cnrc.navy.mil/

Dale, Charles, & Gilroy, Curtis (1983, March). The effects of the business cycle on the size and composition of the U.S. Army. *Atlantic Economic Journal, 11*(1), 42–53. Retrieved from http://www.researchgate.net/publication/225150098_The_effects_of_the_business_cycle_on_the_size_and_composition_of_the_U.S._Army.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Leonhardt, D. (2013, August 22). College costs: Rising, yet often exaggerated. *The New York Times.* Retrieved from: http://economix.blogs.nytimes.com/2013/08/22/college-costs-rising-yet-often-exaggerated/?_php=true&_type=blogs&_r=0.

Martel, J., and Langdon, D. (2001). The job market in 2000: Slowing down as the year ended. *Monthly Labor Review*, 3-30. Retrieved from http://www.bls.gov/opub/mlr/2001/02/art1full.pdf

McNown, Robert F., Udis, Bernard, & Ash, Colin (1980). Economic analysis of the All-Volunteer Force. *Armed Forces & Society, 7*(1), 113–132. Retrieved from afs.sagepub.com.

Murphy, K. (1999). *The impact of regional economic conditions on recruiting* (master's thesis). Retrieved from Calhoun http://calhoun.nps.edu/handle/10945/13632

National Bureau of Economic Research (n.d.). *U.S. business cycle expansions and contractions*. Retrieved from http://www.nber.org/cycles/.

Spring 2014 Youth Poll Propensity (2014). Joint Advertising, Market & Research Studies (JAMRS) [PowerPoint slides]. Retrieved from http://dmren.org/app/mrs/youth-market/studies/mdashofficial-briefings.

State of the Market Prepared for the Navy (2012, June). *Joint Advertising, Market & Research Studies* [PowerPoint slides]. Retrieved from http://dmren.org/static/document_library/2012-06-20/6-20-2012%20STOM%20Navy%20-%20FINAL.pdf.

Warner, J., Simon, C., & Payne, D. (2010). The military recruiting productivity slowdown: The roles of resources, opportunity cost and the tastes of youth. *Defence & Peace Economics, 14,* 329–342. Retrieved from http://www.tandfonline.com/doi/pdf/10.1080/10242690302923#.U6JpyfldWSo.

Williams, K. C., & Page, R. A. (2011, April). Marketing to the generations. *Journal of Behavioral Studies in Business, 3.* Retrieved from http://www.www.aabri.com/manuscripts/10575.pdf.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California